

Name: _____
A2CC Review Q3 Exam 1

Date: _____

This review is not comprehensive. Be sure to review your notes, homework assignments, and old tests as well.

1. The quadratic function $f(x)$ has a turning point at $(5, -8)$. If $g(x) = f(x+7) - 3$, then at which of the following does $g(x)$ have a turning point?

$$\begin{array}{r} -7 \quad -3 \\ \hline (-2, -11) \end{array}$$

(1) $(-2, -11)$

(3) $(-7, -3)$

(2) $(12, -11)$

(4) $(12, -5)$

2. Where does the absolute value function $y = \frac{1}{2}|x-8| + 3$ have a turning point?

(1) $(-4, 3)$

(3) $(8, 3)$

(2) $(4, -3)$

(4) $(8, -3)$

Vertical Compression
right 8
up 3

$$(0,0) \xrightarrow{\text{right 8}} (8,0) \xrightarrow{\text{vert comp.}} (8,0) \xrightarrow{\text{up 3}} (8,3)$$

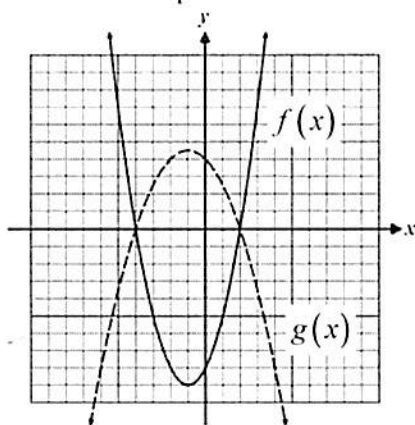
3. The function $f(x)$ is shown below graphed in solid while the function $g(x)$ is shown dashed. Which of the following equations describes the relationship between the two functions?

(1) $g(x) = f(x) - 6$

(2) $g(x) = -\frac{1}{2}f(x)$

(3) $g(x) = 2f(x)$

(4) $g(x) = f\left(\frac{1}{2}x\right)$



Reflection over
x-axis
and a vertical
compression

4. Given that the function $y = x^2 + 6x - 27$ has x -intercepts at $x = -9$ and $x = 3$, where does the function $y = (3x)^2 + 6(3x) - 27$ have x -intercepts?

(1) $x = \pm 6$

(3) $x = -27$ and $x = 9$

(2) $x = -12$ and $x = 0$

(4) $x = -3$ and $x = 1$

$$\frac{-9}{3} = -3 \quad \frac{3}{3} = 1$$

Shows multiply by 3
so divide x -values by 3

5. If the point $(-3, 7)$ lies on the graph of $f(x)$, then which of the following points must lie on the graph of $y = 5f(x) - 20$?

(1) $(-15, -13)$

(3) $(2, -13)$

(2) $(-3, 15)$

(4) $(1, 25)$

Vertical stretch
by factor of 5

down 20

$(-3, 7) \rightarrow (-3, 35) \rightarrow (-3, 15)$

6. The range of the function $f(x)$ is $-4 \leq y \leq 10$. If $g(x) = -f(x) + 3$ then which of the following is the range for $g(x)$?

(1) $-7 \leq y \leq 7$

(3) $-13 \leq y \leq 1$

(2) $5 \leq y \leq 15$

(4) $-3 \leq y \leq 8$

↑ reflection over
x-axis
(switch signs)

up 3
(add 3)

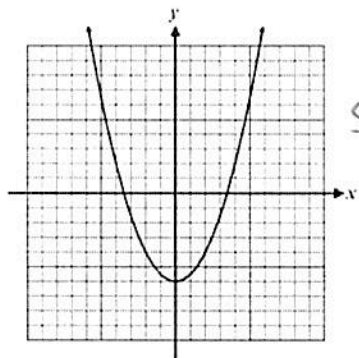
$-4 \leq y \leq 10$

$4 \geq y \geq -10$

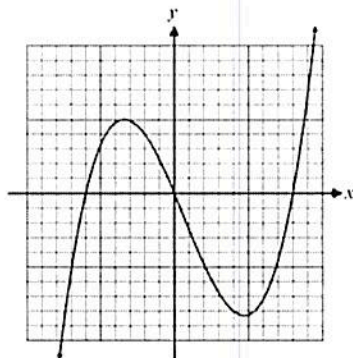
$7 \geq y \geq -7$

7. Which graph below shows an even function?

(1)

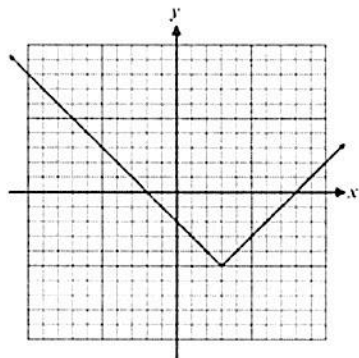


(3)

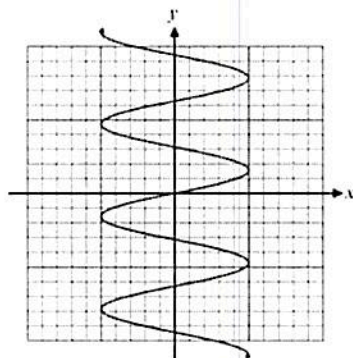


Symmetrical
over
y-axis

(2)



(4)



8. If $f(x)$ is an odd, one-to-one function with $f(5) = -2$ then which point *must* lie on the graph of its inverse, $f^{-1}(x)$?

(1) $(5, -2)$

(3) $(-5, 2)$

(2) $(2, -5)$

(4) $(2, 5)$

$f(-5) = 2$

$f(x)$ has

$(5, -2)$

$(-5, 2)$

$f^{-1}(x)$ has

$(-2, 5)$

$(2, -5)$

9. The parabola $y = 3x^2 - 24x + 55$ can be written in the form

(1) $y = 3(x-2)^2 + 2$

(3) $y = 3(x+2)^2 - 11$

(2) $y = 3(x-8)^2 + 55$

(4) $y = 3(x-4)^2 + 7$

$$y = 3(x^2 - 8x + 16) + 55 - 3(16)$$

$$-\frac{8}{2} = -4$$

$$(-4)^2 = 16$$

$$y = 3(x-4)^2 + 55 - 48$$

$$y = 3(x-4)^2 + 7$$

Free Response

10. For the function $f(x)$ it is known that $(-12, 4)$ lies on the function. A second function, $g(x)$, is defined by the formula $g(x) = f(2x) - 3$.

Describe the transformations that occur to the graph of f in order to produce the graph of g .

① horizontal compression by a factor of 2
② Shift down 3

① Multiply x by $\frac{1}{2}$
OR ② Subtract 3 from y

Based on the fact that the point $(-12, 4)$ lies on $f(x)$, what point must lie on $g(x)$?

horizontal compression down 3
 $(-12, 4) \longrightarrow (-6, 4) \longrightarrow (-6, 1)$

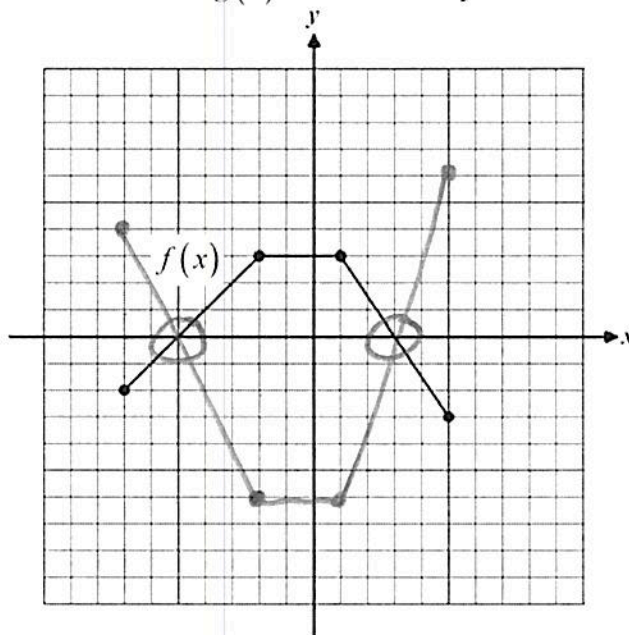
11. The graph of the function $f(x)$ is shown below. The function $g(x)$ is defined by the formula $g(x) = -2f(x)$ for all values of x .

Produce the graph of g on the same grid.

$f(x)$	$g(x)$
$(-7, -2)$	$(-7, 4)$
$(-2, 3)$	$(-2, -6)$
$(1, 3)$	$(1, -6)$
$(5, -3)$	$(5, 6)$

Solve the equation $f(x) = g(x)$ for all values of x .

They cross at
 $x = -5$ and $x = 3$



12. The function $f(x) = \frac{x^4 - 8}{4x}$ is either an even function or an odd function. Provide evidence to support your answer. *plug into calculator*

x	y
-3	-73/12
-2	-1
-1	7/4
0	Error
1	-7/4
2	-1
3	-73/12

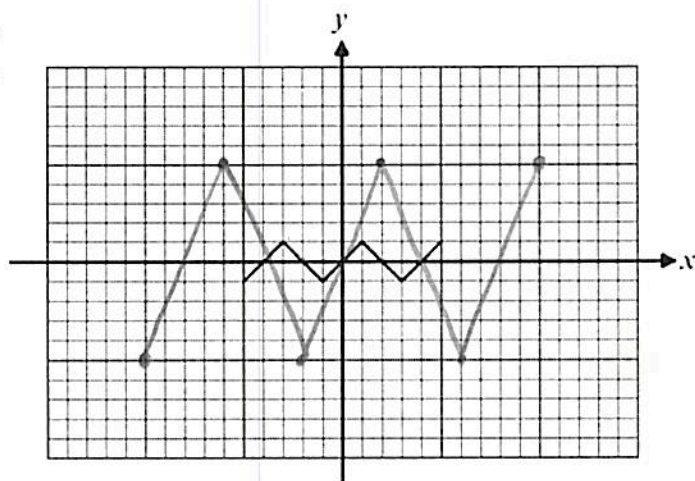
x switches sign
and y switches sign
therefore it is **ODD**

13. The graph of $f(x)$ is shown below. The function $g(x)$ is defined by $g(x) = 5f\left(\frac{x}{2}\right)$.

Explain the transformations that will transform the graph of $f(x)$ into the graph of $g(x)$ and then produce it on the same grid.

- ① Horizontal stretch by a factor of 2
(multiply x-values by 2)
② Vertical stretch by a factor of 5
(multiply y-values by 5)

$f(x)$	$g(x)$	$f(x)$	$g(x)$
$(-5, -1)$	$(-10, -5)$	$(3, -1)$	$(6, -5)$
$(-3, 1)$	$(-6, 5)$	$(5, 1)$	$(10, 5)$
$(-1, -1)$	$(-2, -5)$		
$(1, 1)$	$(2, 5)$		



14. The function below shows the portion of the even function $f(x)$ for $x \geq 0$.

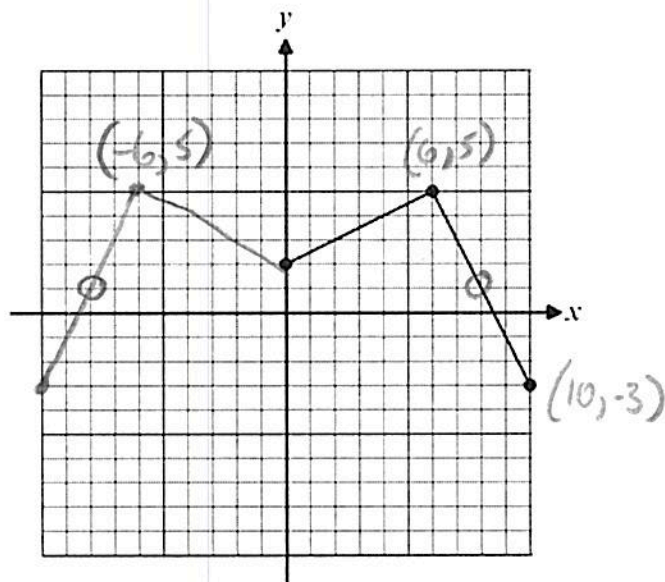
Sketch the portion of $f(x)$ for $x < 0$.

x-values switch
y-values stay same

What value(s) of x solve the equation $f(x) = 1$?

Where is the y-value = 1?

Q $x = -8, 8$



Does this function have an inverse that is also a function? Why or why not?

- No b/c $f(x)$ is not 1 to 1
- $f(x)$ does not pass the horizontal line test.

15. Given the parabola $f(x) = -(x-8)^2 + 5$, describe three transformations which would transform the graph of $y = x^2$ into the graph of $f(x)$. Give both the transformations and the order.

- ① Shift right 8
- ② Reflect over the x -axis
- ③ Shift up 5

16. Describe the difference between the transformations $f(-x)$ and $-f(x)$ on the graph of $f(x)$.

$f(-x)$ is a reflection of $f(x)$ over the y -axis
 $-f(x)$ is a reflection of $f(x)$ over the x -axis

17. A function $g(x)$ has a domain of $-5 \leq x \leq 10$ and a range of $y \leq 15$. If a new function is defined by $y = 5g(-x) + 3$, then what are its domain and range? Explain how you found your answer.

reflect over y -axis \rightarrow $-5 \leq x \leq 10$
 $5 \geq x \geq -10$
 $-10 \leq x \leq 5$

$y \leq 15$
 $y \leq 75$ ← stretch by factor of 5
 $y \leq 78$ ← up 3

18. Place the following quadratic function in $y = a(x-h)^2 + k$. Identify the coordinates of its turning point.

$$-\frac{4}{2} = -2 \quad (-2)^2 = 4$$

$$y = 3x^2 - 12x + 23$$

$$y = 3(x^2 - 4x + 4) + 23 - 3(4)$$

$$y = 3(x-2)^2 + 11$$

$$(2, 11)$$

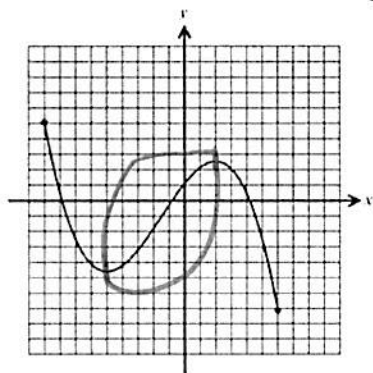
19. Given the function shown below, over which of the following intervals is the function always increasing?

(1) $0 < x < 5$

(2) $-5 < x < 2$

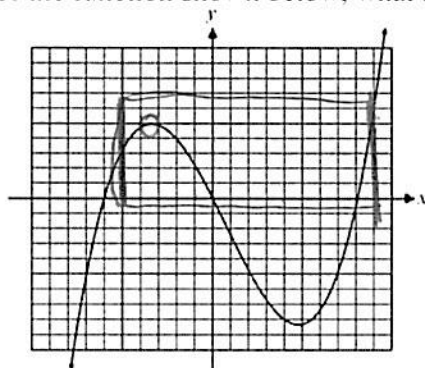
(3) $-1 < x < 4$

(4) $-9 < x < -5$



20. Given the graph of the function shown below, what is its maximum value of the interval $-5 \leq x \leq 9$?

- (1) 5
(2) 6
(3) 3
(4) 10



21. Simplify the following (Be sure to indicate restrictions):

LCD: x^2

$$\frac{1 + 5x^{-1} - 14x^{-2}}{x - 4x^{-1}} = \frac{1 + \frac{5}{x} - \frac{14}{x^2}}{x - \frac{4}{x}} = \frac{\frac{x^2 + 5x - 14}{x^2}}{\frac{x^2 - 4}{x}} = \frac{(x+7)(x-2)}{x(x+2)(x-2)}$$

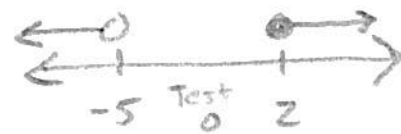
rest: $x \neq 0, +2, -2$

$$= \boxed{\frac{x+7}{x(x+2)}}$$

22. Solve and express your solution on a number line and in set builder notation:

$$\frac{2x-4}{x+5} \geq 0$$

$2x-4=0 \quad x+5=0$
 $2x=4 \quad x=-5$
 $x=2 \quad \text{open}$
 closed



SB: $\{x \mid x < -5 \text{ or } x \geq 2\}$

23. Solve algebraically for x: $\frac{x}{2x+8} + \frac{2}{2x-8} = \frac{16}{x^2-16}$

LCD:
 $2(x+4)(x-4)$
 $x \neq -4, 4$

$$\frac{x(x-4)}{2(x+4)(x-4)} + \frac{2(x+4)}{2(x-4)(x+4)} = \frac{16(x+4)(x-4)}{(x+4)(x-4)}$$

$$x(x-4) + 2(x+4) = 16(2)$$

$$x^2 - 4x + 2x + 8 = 32$$

$$x^2 - 2x + 8 = 32$$

$$x^2 - 2x - 24 = 0$$

$$(x-6)(x+4) = 0$$

$x=6$ $x=-4$
 reject
 (restriction)

24. Simplify the following and indicate all restrictions:

$x \neq -2, 2, -\frac{1}{2}, 1, -1, 3$

$$\frac{(2x+1)(x+2)}{x^2-4} \cdot \frac{(x-3)(x-2)}{4x+2} \div \frac{2(x-3)(x+1)}{4x^2+8x+4}$$

$$= \frac{(2x+1)(x+2)}{(x+2)(x-2)} \cdot \frac{(x-3)(x-2)}{2(2x+1)} \cdot \frac{4(x+1)(x+1)}{4(x-3)(x+1)}$$

$$\boxed{x+1}$$